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Editorial

Dr. André Corriveau, Chief Medical Health Officer, Department of Health and Social Services

The current issue of EpiNorth contains three articles relating to the tuberculosis (TB) outbreak of 2007-08 that had its epicentre in the homeless men shelter operated by the Salvation Army in Yellowknife. Beginning with the index case diagnosed at the end of March 2007, a total of 14 active pulmonary TB cases have since been associated with the outbreak, with an additional 20 cases showing evidence of recent exposure to *Mycobacterium tuberculosis* through a positive skin test. More than over 800 contacts having since required further follow-up and investigations.

This outbreak serves as a reminder that TB is as much a social problem as it is a medical disease and that it does not strike randomly in the population. Every additional case of active TB that was linked directly to the index patient occurred in a person that had also resided in the shelter at some point during the winter of 2007. Only one of the 20 contacts with a newly positive skin test was a person who was not part of the homeless population. Meanwhile, none of the many workers who provide direct services at the shelter were found to have been infected.

As with any other event that stresses a system's capacity, the outbreak also provided us with an opportunity to learn more about our health care and public health system's strengths and weaknesses. These findings can help us make appropriate adjustments to improve our effectiveness over the long-term. For example, communications within Yellowknife between the public health unit, primary community care clinics and the emergency department at Stanton Territorial Hospital (STH) have been greatly streamlined and strengthened. There has been a significant expansion and strengthening of outreach program activities in partnership with non-governmental organizations working with the homeless population and other at-risk groups in the city. Weekly TB rounds at STH were revitalised and its mandate as well as membership expanded with a greater emphasis on systemic issues and the multi-disciplinary approach to address the social and medical issues.

It is also worth mentioning that one of the greatest successes in mitigating this outbreak was the flexible, holistic and integrative approach taken by all key players in working with the homeless men impacted. Basic needs such as transport and food, as well as emotional support to build trust and compliance of the clients, needed to be addressed as first priorities. The non-governmental organizations (mainly the Salvation Army) were required to increase their understanding of the health issues faced by their clients in order to mitigate the impact of the outbreak, which led to changes in infection control practices as well as greater support to clients with health needs. Many of the clients themselves also realized that to achieve the best recovery they also had to deal with their addiction issues through appropriate counseling and treatment. In the end, this united effort with its complex interfacing produced an integrated and successful effort that minimized the potential for a much larger outbreak.

Northwest Territories Health and Social Services

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EPINORTH

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Since the late 1960's, when TB rates averaged around 600/100,000 population, the NWT has experienced a sharp decline in the annual incidence of the disease. The last community outbreak, which occurred in 1995, resulted in a total of 44 new active cases and 138 Mantoux test skin test converters. Over the past decade, the average yearly number of cases has been nine, for a rate of 21/100,000. The disease has now mostly retrenched to the elderly and to marginalized high-risk populations who are also struggling with mental health, addictions and homeless issues, exemplified by the past year's outbreak.

In this context, the medical and public health responses to TB and other health issues will not be sufficient unless we also learn to effectively tackle the socio-economic determinants that give rise to health disparities in our population. The *Framework for the GNWT Response to Homelessness*, which was released in January 2007, outlines a government-wide response to this growing social issue and is a demonstration of how social program departments can work together in partnership with other agencies. Concrete achievements include the Small Community Homeless Fund that in 2007/08 supported five Homelessness Support Projects and three Emergency Shelter Options projects in five communities. The Yellowknife homeless coalition which consists of NGO's, GNWT and the City of YK have been an active collaborative partnership that has a community plan to address homelessness. The soon-to-be opened Bailey House in Yellowknife will add another important element to the long-term solution of the complex issue of homelessness in our society. Similarly, the adequacy and effectiveness of our responses to growing rates of sexually transmitted and blood-borne infections, injuries or even obesity and cancer, will be measured by our willingness and ability to work in an intersectoral way on the underlying determinants rather than simply relying on the health sector to somehow do a better job on its own.

Annual Review of Tuberculosis for 2006 and 2007

Cheryl Case, Communicable Disease Specialist

Department of Health and Social Services

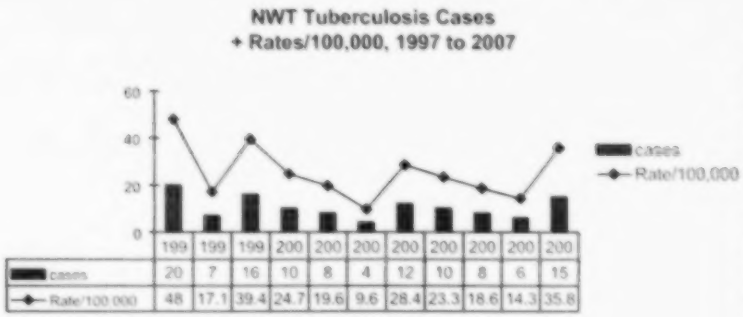
This report summarizes the descriptive epidemiology of TB cases for 2006 and 2007, and provides a review of trends in the disease, outcomes of contact tracing and surveillance.

Background:

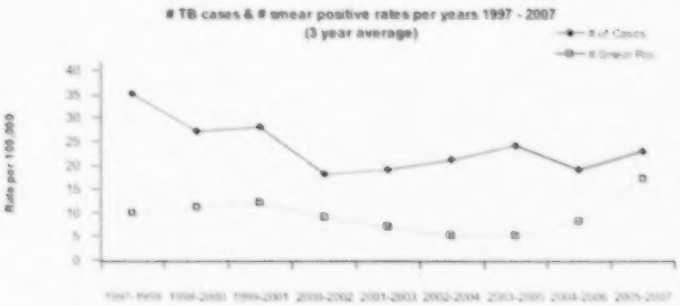
TB is primarily a disease of the respiratory system that is spread through the air by tiny droplet nuclei containing *Mycobacterium tuberculosis*, the bacterium causing disease. Those who breathe the contaminated droplets are at risk of becoming infected and developing the disease. Approximately 5 % of immunocompetent hosts who breathe in the contaminated air droplet and become infected actually develop the active disease, known as tuberculosis.[1]

Figure 1, demonstrates the gradual decrease in TB rates since 1997. In 2007, a TB outbreak occurred among the homeless population, located primarily in Yellowknife. A summary of the outbreak is covered in Robyn Mitchell's article in this issue titled, " TB Outbreak Investigation in Yellowknife". In Figure 2, the 3-year running average is shown to have been between 20-25 per 100,000 population since 2002, putting the NWT TB rate at 4-5 times the national rate.[2] The smear positivity rate for respiratory cases has been increasing since 2004. This is indicative of cases being identified at a more advanced and infectious stage at the time of diagnosis. A case of smear positive cavitary TB infects approximately 30% of the high-risk contacts.[1]

Figure 1: NWT Tuberculosis Case Numbers and Rates



	199	199	199	200	200	200	200	200	200	200	200
cases	20	7	16	10	8	4	12	10	8	6	15
Rate/100,000	48	17.1	39.4	24.7	19.6	9.6	28.4	23.3	18.6	14.3	35.8



Case Presentations:

There are striking differences to note in the case presentations for 2006 and 2007. The case presentations for 2006 cases were primarily non-respiratory. Two cases were respiratory while the other four were: peritoneal, retinitis, pericardial and renal. Each of these cases presented unique challenges including: end stage renal failure, isoniazid resistance, unobtainable culture for diagnosis of retinitis, and radical pericardectomy, which eventually resulted in cardiac failure and death. Seventy percent of the cases reported in 2007 were associated with the men's shelter outbreak in Yellowknife. The outbreak cases were primarily in the male Aboriginal population; all were respiratory presentation. There were two cases in 2007 that were not related to the outbreak. One was a miliary tuberculosis complicated with hepatic cirrhosis, and the other was non-pulmonary localized to a lymph node.

Table 1: Case Summary

	2006	2007
Number of cases	**6**	**15**
Ethnicity	Aboriginal ..... 5 Non-aboriginal 1	Aboriginal 15
Gender	Males ..... 4 Females 2	Males ..... 13 Females 2
Health & Social Services Authority	Beaufort Delta ..... 2 Tlicho ..... 2 Dehcho ..... 1 Yellowknife 1	Beaufort Delta ..... 2 Tlicho ..... 3 Hay River ..... 1 Yellowknife 9
Presentation	Pulmonary ..... 2 (direct smear negative culture pos.) Non-pulmonary ..... 4 1 peritoneal 1 retinitis 1 pericardial 1 renal	Pulmonary ..... 12 (direct smear positive)+ 1 miliary Non-pulmonary ..... 3 1 primary 1 pleurisy 1 lymphadenopathy
HIV	Negative ..... 6 Positive 0	Negative ..... 15 Positive 0
Drug Susceptibility	4 of 6 were culture confirmed. • 3 M. tuberculosis isolates were susceptible to all 1st line antibiotics, while 1 isolate was resistant to INH.	14 of 15 were culture positive. • All isolates were susceptible to all 1st line antibiotics.

Figure 3 illustrates the geographic Health and Social Services authorities where TB is most prevalent; Tlicho, Dehcho and Yellowknife. Figure 4 shows the gender breakdown for the cases with predominately being male in both reporting years. All of the cases for both years were in the 20 and older category. There were no pediatric cases reported in either reporting period.

Figure 3: Health Authorities Tuberculosis Rate per 100,000 by Person Years 1997-2007

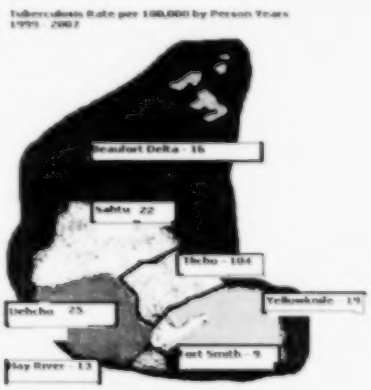
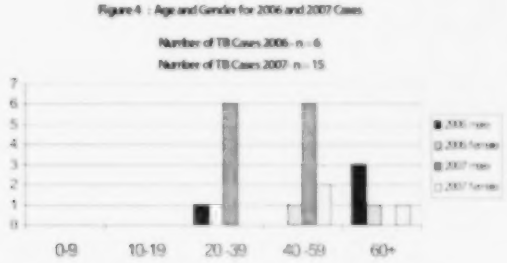


Figure 4 : Age and Gender for 2006 and 2007 Cases



Treatment Outcomes:

For the cases in 2006, two of the cases died before treatment completion with one death directly attributable to TB. Treatment outcomes cannot be reported for 2007, since several of the cases are still undergoing treatment.

Contact Summary for 2006:

As stated above, only two of the six cases in 2006 were pulmonary, both smear negative. The total number of contacts screened was 56. The number of contacts who had Mantoux testing done was 28, with three having reactions measuring 5mm or greater. Two of the contacts were children with Mantoux results of 5mm, both of whom were treated. The third one had a reaction of 13 mm and opted to be followed through surveillance. The remaining 38 contacts had a history of previous TB infection with seven not having records of previous treatment. All were assessed and offered treatment for latent TB infections (LTBI) but all have so declined and will therefore be followed up clinically.

Contact Summary for 2007:

In 2007, five of the 15 cases with respiratory disease were smear positive, with two presenting with advanced TB disease. The total number of contacts was 1,080 with the following outcomes:

- 12 cases were identified due to contact tracing associated with the men's shelter outbreak; two were later determined to be incidental findings through DNA genotyping and all others that were epidemiologically linked.
- 43 of the 699 Mantoux tests were positive.
- Of the 43 contacts with a positive Mantoux, 25 have been treated or are being treated for LTBI; five have been referred to another province, while the remaining 13 have been offered treatment but have opted to be followed through periodic clinical reassessment.

Surveillance:

Surveillance is an important component of the TB program. It focuses on high-risk groups as well as screening school children aged 5, 10 and 15 years. Target areas include residents in long-term care and correctional facilities as well as people who are chronically ill with cancer, diabetes, renal disease, including those on immunosuppressive therapy and individuals who are homeless. Overall, all new cases were identified through symptom presentation and contact tracing. However, detection of LTBI was facilitated by active surveillance and every opportunity taken to prevent later progression to active disease. In 2006, there were 1,958 Mantoux tests done through surveillance, where 181 were positive (reaction 10 mm or greater) and 98 were treated.

In 2007, 2,205 Mantoux tests were done in the surveillance programs throughout the NWT. 201 were positive and 2,004 were negative. Of the 201 positive Mantoux tests, 128 were treated for LTBI.

Conclusion:

Tuberculosis remains a communicable disease of concern in the NWT. Although the outbreak among the homeless population located primarily in Yellowknife has seen a substantial increase in the TB rate during the last year, it lends itself to remind us of the vulnerability to this disease in the marginalized and immune-weakened groups. The apparent increase in the number of cases diagnosed at the smear-positive stage is also of concern, suggesting the need to step up our efforts with regard to health care provision and public education.

References

1. Long R. and E. Ellis. ed *Canadian Tuberculosis Standards* 6th ed. 2007. Minister of Health, Canada.
2. Tuberculosis in Canada 2006 - Pre Release. http://www.phac-aspc.gc.ca/publicat/2007/tbcanpre06/index-eng.html Accessed April 2, 2008.

TB from a Public Heath Nursing Perspective

Heather Leslie RN, Public Health Nurse
Yellowknife Health and Social Services Authority

Picture yourself on a cold March day, with the wind blowing and your glasses fogging up, standing outside the post office giving a client his TB medications. This is just one of the ways the staff at Yellowknife Health and Social Services Authority are fighting TB.

The TB outbreak that started in March 2007 with the index case and ended the year with 12 cases, has presented some interesting challenges to bringing the outbreak under control.

One of our main challenges consisted of contacting roughly 800 contacts of the index case, ranging in location from the Salvation Army Shelter, RCMP cells, the hospital, various places in Yellowknife, an airplane and Larga House in Edmonton, of which all required follow-up. Contact tracing began in earnest with the help of the Stanton Territorial Hospital infection control staff and with tremendous help from the Salvation Army staff. Throughout the year, 11 more cases of TB were identified and 12 additional people were put on prophylaxis for latent TB infection as a result of contact tracing.

A street worker with knowledge of the population being traced was hired and has been an important person in helping us with contact tracing. The nursing staff gained insight from the street worker into how to work with this hard-to-serve population.

Salvation Army staff and the street worker collected sputum specimens, educated the clients about the disease and helped when clients needing their medication were hard to find.

Incentives were considered to be an important factor to ensure compliance for both clients on treatment for the disease as well as those on prophylaxis. Meal vouchers, provided by a local Subway restaurant were found to be a great incentive to promote compliance for our street population and stickers and chocolate syrup work great for the children.

Working relations with the North Slave Corrections Centre were also strengthened; as a number of high-risk contacts were screened and some cases were diagnosed with TB within the facility. Visits by a Public Health Nurse to inmates about to be released has been instrumental in a smooth transition of their treatment.

Back to the cold days of March, the TB team makes its rounds to the Salvation Army, the post office, RCMP cells and the schools in town, delivering medications. One year later, we continue to follow many high-risk contacts, some of whom have come in contact with more than one case of TB.

We are still looking for the next case of TB among this population.

The continuing fight against this TB outbreak requires ongoing resources from:

- **Stanton Territorial Health Authority Infection Control**
- **The Salvation Army**
- **Nurse Practitioners**
- **Internists & General Practitioners**
- **Lab and X-Ray**
- **Correctional Facilities**
- **Community Nurses**
- **Medical Clinics**
- **Public Health**
- **Department of Health and Social Services–Office of the Chief Medical Health Officer**

Tuberculosis Outbreak in a Homeless Northern Population, 2007

Robyn Mitchell, MHSc, Canadian Field Epidemiology Program

Introduction

Tuberculosis (TB) in the homeless population is a significant public health concern. Compared with the general population, the homeless are at a greater risk for latent tuberculosis infection (LTBI) and progression to active disease.[1] Factors such as overcrowded living conditions, substance abuse and chronic health problems contribute to the increased risk of TB infection and disease in this population. Public health authorities in the Northwest Territories face additional challenges in TB control due to the higher incidence of TB among Aboriginals as compared to Canadian-born non-Aboriginal people.[2]

On March 27, 2007 the Department of Health and Social Services of the Northwest Territories was notified by Alberta Health and Wellness of a highly infectious case of TB in a homeless Yellowknife man. In collaboration with the Yellowknife Public Health Unit traditional contact tracing was initiated to identify, locate and test contacts. Active and latent cases were treated. This report summarizes the investigation of a TB outbreak among a homeless northern population and the methods used to identify active cases and contacts at highest risk of exposure and control measures implemented to prevent further transmission.

Methods

Index case history

On March 26, 2007 a 58 year-old Yellowknife man was diagnosed with advanced pulmonary TB. The diagnosis was made in Edmonton, following a referral for suspected lung cancer. Sputum was smear positive (4+) for acid-fast bacilli (AFB) and subsequently culture positive for *Mycobacterium tuberculosis* sensitive to all first line antibiotics.

The man was living at a local shelter from September 2006 to his hospital admission in March 2007. He also spent several nights at the local RCMP holding cell. He lived with his sister for a very short period of time shortly before his diagnosis when he was very ill. In 2002, he had been diagnosed with latent tuberculosis Infection (LTBI) but had not been treated at that time due to social circumstances. Risk factors for active disease included alcoholism, smoking, LTBI, homelessness and malnourishment.

Following his diagnosis, he remained at the University of Alberta Hospital for two and a half months before being transferred back to the Stanton Territorial Hospital in Yellowknife on June 12, 2007, from where he was discharged in August 2007. He was followed by the Yellowknife Public Health Unit for monitoring of ongoing treatment twice weekly. He recovered completely after a 12-month course of treatment.

Exposure location

The men's shelter is a 46-bed facility in the centre of Yellowknife. There are four rooms for sleeping, two rooms have mats for sleeping and the other two rooms have bunk beds. Each room has one window which does not open, therefore air ventilation is poor. New clients must complete an intake form, which collects details on current medical conditions, medications and any identifying factors such as body piercing and tattoos and copies of identification, photo ID and emergency contacts.

Case definition

A case of TB linked to this outbreak was defined as an identified contact with mycobacterium tuberculosis complex demonstrated on culture, specifically *M. tuberculosis*, *M. africanum*, *M. canetti*, *M. caprae*, *M. microti*, *M. pinnipedii* or *M. bovis* (excluding *M. bovis* BCG strain) with either an epidemiologic link to the index case or identical DNA fingerprinting by restriction fragment length polymorphism (RFLP) to the index case.

Contact tracing

The NWT Department of Health and Social Services immediately initiated contact tracing after notification by the Alberta Health and Wellness TB control.

Contacts were defined as:

1. Individuals who had shared a room (either room101 and/or room 102) with the index case during his period of infectiousness (September2006 to March 2007) as per the shelter client registry.

2. Staff who worked at the shelter from September 2006 to March 2007.
3. Hospital staff from either the Edmonton hospital or the Stanton Territorial Hospital that were exposed to the index case.
4. Individuals who stayed at the hospital boarding house in Edmonton from March 21, 2007 to March 28, 2007.
5. RCMP staff who were working during the times when the index case was brought into the holding cell.
6. Contacts from the airplane from Yellowknife to Edmonton were defined using the World Health Organization(WHO) protocol.[3] A passenger manifest was obtained from the northern air carrier. Individuals sitting in the same row and the two rows in front and behind the index were defined as contacts on the same light from Yellowknife to Edmonton. Although the flight was less than 8 hours, due to the high level of infectiousness of the case, public health authorities included those individuals as contacts.

For contacts that resided outside of Yellowknife, Northwest Territories, Health and Social Services contacted either the community health centre or the public health unit in the appropriate jurisdiction for contact follow-up.

Contacts were prioritized for investigation based on their proximity and length of exposure to the index case. Contacts were classified as high, medium or low risk according the Northwest Territories Tuberculosis Manual.[4]

Table 1: Type of contact by high, medium and low risk

RISK LEVEL	EXAMPLE
High risk – household (shelter) and prolonged contact	• **Individuals with contact > 8 hours** • **Shelter contacts who slept in room 101 and/or 102 with the index case**
Medium risk – frequent contact and short intervals	• **Cellmates in the holding cell** • **Hospital workers who performed high risk medical procedures** • **Sister and partner**
Low risk – minimal exposure	**RCMP officers**

The infectivity rate is defined as the percentage of contacts who had either a TST_1 or TST_2 >5mm of all contacts tested. Yellowknife public health notified all contacts who had been exposed to TB. Exposed contacts received a tuberculin skin test (TST) unless there was a history of prior TB disease or latent infection, or a documented prior positive TST greater than 10mm. The TST was carried out and interpreted regardless of BCG vaccination status. Since conversion of the TST from negative to positive can take up to 8 weeks after infection, a second skin test (TST_2) was carried out at least 8 weeks after the contact was broken. A converter was defined as a contact with a negative TST_1 and a subsequent positive TST_2 (>5 mm induration). A reactor was defined as a contact with a positive TST_1. For the majority of cases there was no baseline TST data available to determine if there was a prior infection. Therefore for this investigation the definition of a new LTBI is as follows: any contact with a TST_1 or TST_2 >5mm where active TB has been excluded.

Contacts who had documented previous TB or LTBI received follow-up screening. His information was obtained from records entered into integrated-Public Health Information System (iPHIS). Follow-up testing consisted of a first and second round chest X-ray and/or sputum collection. Screening was considered complete when the contact had two normal chest X-rays (or one normal chest X-ray 3 months post exposure) or two negative

sputum, either smear or culture results (or one negative sputum 3 months post exposure). As several of the contacts were exposed to multiple cases, a contact that had completed screening may have had to undergo additional rounds of screening if they had been re-exposed to another case of TB.

Due to the high prevalence of LTBI, which is estimated to range from 25.0% to 33.7% in the Canadian-born Aboriginal population[5], and the challenges associated with administering and reading the TST, sputum collection replaced TST as a screening tool at the beginning of September 2007.

Laboratory analysis

Sputum cultures were analyzed at the Stanton Territorial Hospital and sent to the Provincial Laboratory in Edmonton for confirmation, susceptibility testing and DNA fingerprinting. Restriction fragment length polymorphism (RFLP) analysis of *M. tuberculosis* was performed by the Provincial Laboratory in Edmonton according to standard methods. RFLP patterns were considered to match if the patterns were identical or differed by only a single band.

Data analysis

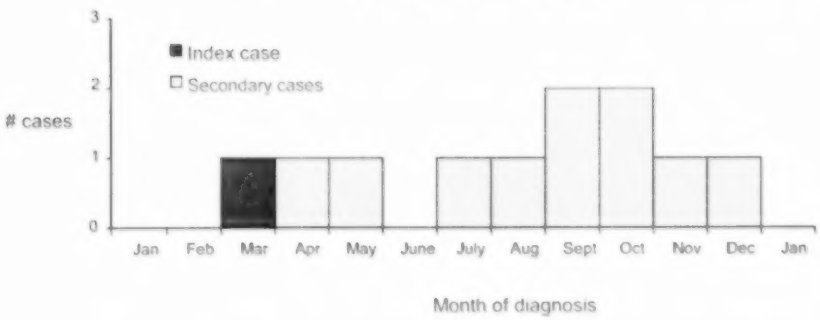
Case and contact details were entered into iPHIS through a rapid entry screen. A line list was generated in Microsoft Excel, which reported on the contact details for each case. A master list of contacts was created to include contacts from all eleven cases. The final analysis was limited to the most recent status of a multiply named contact. The data was exported into SPSS 11.0 and descriptive analysis was performed.

Results

Cases

(Figure 1)Ten secondary cases were identified between April 2007 and December 2007.

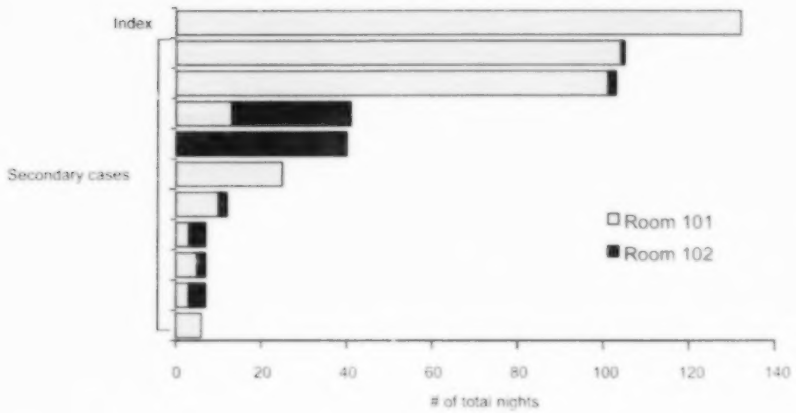
Figure 1 : Number of outbreak related TB cases in Yellowknife, March 2007 to January 2008



The median age of the ten cases was 42 years. All of the cases were male and all were aboriginal. None of the cases were co-infected with human immunodeficiency virus (HIV). Four (40%) of the cases had a history of previous TB infection, five (50%) of the cases had a record of BCG vaccination and one case (10%) had a record of BCG and previous TB infection. All of the cases were started on directly observed therapy (DOT).

Figure 2 illustrates that nine of the ten secondary cases stayed in either room 101 and/or room 102 at the shelter at the same time as the index case. Note that these are not necessarily consecutive nights but the total number of nights spent in room 101 and/or room 102 during the infectious period of the index case (September 2006 to March 2007). Even though one of the secondary cases has no record of staying in room 101 he was a regular client at the shelter where transmission was ongoing and shared a room with other high risk contacts. As the shelter client registry was incomplete, it is possible that he shared a room with the index case between September 2006 and March 2007.

Figure 2. **Total number of nights spent at the shelter from September 2006 to March 2007, by case**



Contact tracing results

As of February 5, 2008, the investigation of the eleven cases identified a total of 736 contacts. The results of contact tuberculin skin test (TST) are shown in Table 2.

Table 2. Tuberculin skin testing results for high, medium and low risk contacts

	CONTACTS (%)	TST1 –VE (%)	TST1 +VE* (%)	TST2 –VE (%)	TST2 +VE* (%)
High risk	117 (30)	12 (3)	16 (4)	87 (22)	2 (0.5)
Med risk	173 (45)	78 (20)	12 (3)	83 (21)	-
Low risk	98 (25)	28 (7)	4 (1)	65 (17)	1 (0.3)
Total	388	118 (30)	32 (8)	235 (61)	3 (0.8)

*positive => 5mm induration

A decision to expand the contact investigation beyond the high-risk group was made because the infectivity rate of the high-risk group for the index case was greater than 10%. According to the TST results, there were three converters and 32 reactors identified in this outbreak. Of the 35 contacts identified with LTBI, 60% (n=21) were treated. Fifty-six contacts had either refused screening or screening was still pending as of February 2008.

As described above, sputum collection replaced TST as a screening tool during contact tracing. Therefore, 24% (n=180) of contacts eligible for a TST instead had a sputum sample collected. Of these, only one contact was culture positive and treated though it was later determined to be an atypical mycobacterium. According to iPHIS records, 98 contacts had a prior history of TB disease or infection. The following table illustrates the screening results of those contacts.

Table 3. Screening results for contacts with history of previous TB disease or infection

	CONTACTS (%)	SCREENING COMPLETE*(%)	SCREENING INCOMPLETE (%)	NOT YET TESTED (%)
High risk	67 (68)	29 (30)	19 (19)	19 (19)
Med risk	25 (26)	12 (12)	11 (11)	2 (2)
Low risk	6 (6)	2 (2)	1 (1)	3 (3)
Total	98	43 (44)	31 (32)	24 (24)

*screening complete = two normal CXR (or one normal CXR 3 months post exposure) or two negative sputum, either smear or culture results (or one negative sputum 3 months post exposure).

Two contacts of a secondary case were diagnosed with active tuberculosis but were later determined to be unrelated to the outbreak. Twelve contacts were referred out of territory.

Laboratory analysis

Cultures from the ten cases and the index case were positive for M. tuberculosis and all isolates were susceptible to first-line drugs. Three cases (including the index) had positive AFB sputum smears. DNA fingerprinting confirmed that six of the eleven cases (including the index case) were closely related. DNA fingerprinting is pending for the remaining five cases. Two contacts of a secondary case were diagnosed with active tuberculosis but were determined to be not genetically related to the outbreak strain.

Discussion

In March 2007, the Northwest Territories Department of Health and Social Services launched an investigation following the identification of a highly infectious case of TB who was a regular client of a homeless shelter in Yellowknife. An additional 10 active cases and 736 unique contacts were identified from April 2007 to December 2007. Of the 388 (53%) contacts screened using a TST, 3 converters and 32 reactors were identified, 60% (n=21) of which accepted treatment. This investigation identified the shelter in Yellowknife as the likely site of transmission for this outbreak as all secondary cases were clients of the shelter and nine of the ten secondary cases shared a room with the index case during his period of infectiousness.

Information gathered at TB rounds at the Stanton Territorial Hospital and during meetings with Yellowknife Public Health identified many challenges related to contact tracing and treatment of TB in the homeless population. Eighty-nine per cent of identified contacts were tested and of those, 72% completed screening. Notifying and testing contacts was problematic as some contacts were difficult to locate or were not compliant (e.g. did not return for a follow-up skin test reading). It was noted that alcoholism, drug abuse, LTBI and transient lifestyles further complicated contact tracing and treatment. Strategies implemented to deal with these challenges included the recruitment of additional nurses and a nurse practitioner who provided clinical management to each contact. A street worker was a vital resource in locating contacts as well as coordinating screening (e.g. collecting sputum samples, arranging for transportation to the hospital for X-rays etc). Screening methods shifted away from the traditional TST and focused on sputum collection in order to quickly identify cases and reduce logistical problems associated with the TST. Future public health initiatives include using a cough monitor at the shelter to assist with TB surveillance, installing a hepa filter in shelter rooms to improve ventilation and using a social network approach to generate contacts if additional cases are identified outside of the targeted population.

Interpretation of screening results was also problematic. Due to the lack of recent baseline TST data, it was difficult to separate positive results that represented a new infection transmitted by the index case or a reactivation of a previous infection. Data on prior infections was available in iPHIS; however, it was neither recent nor consistently available for all contacts. In this outbreak, because there were multiple cases residing in the same setting, an individual may have been listed as a contact for more than one case (i.e. a multiple named contact). The most recent status for each individual was captured in this report. Therefore, the results may under-represent the total number of TST done, but accurately reflect the true number of individuals investigated. Due to the complexity and volume of contact tracing data, this investigation highlights the importance of compiling specific and comprehensive contact tracing lists as well as managing data in an efficient database. The list of shelter clients was invaluable, as it provided the majority of high-risk contacts who required screening.

This outbreak clearly demonstrates the challenges of contact tracing in the homeless population. However, it also illustrates how a central-dedicated team of public health, acute care, laboratory and the community can work together to conquer these challenges. Achieving TB control in this outbreak will require continued contact investigation and successful treatment of cases with newly diagnosed TB disease or LTBI.

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Diseases

CUMULATIVE TOTALS for the Northwest Territories (NWT) January - March, 2008[a]

		January - December, 2007	January - March 2008
		NWT	NWT
Vaccine Preventable Diseases	Hepatitis B	0	0
	Haemophilus Influenza	0	0
	Influenza A	13	24
	Influenza B	12	26
	Pertussis	0	0
	Chicken Pox	16	7
Sexually Transmited/ Bloodborne Diseases	Chlamydia	753	155
	Gonorrhea	221	61
	Hepatitis C	16	1
	Hepatitis, Other	0	0
	Syphilis	0	0
Diseases by Direct Contact/ Respiratory Route	Invasive Group A Strep	8	3
	Invasive Group B Strep in neonates	0	0
	Invasive Group B Streptococcus	1	0
	Invasive Pneumococcal Disease	20	6
	Legionellosis	0	0
	Listeriosis	0	0
	Meningitis/Other Bacterial	0	0
	Meningitis/Unspecified	1	1
	Meningitis/Viral	1	0
	Meningococcal Infections	1	0
	Respiratory Syncytial Virus	118	13
	Tuberculosis	15	2
Enteric, Food and Waterborne Diseases	Botulism	0	1
	Campylobacteriosis	8	2
	Cryptosporidiosis	0	0
	E.Coli 0157:H7	4	0
	Giardiasis	5	0
	Hepatitis A	0	0
	Salmonellosis	14	2
	Shigellosis	0	0
	Tapeworm	0	0
	Trichinosis	0	0
	Yersinia	0	0
Vectorborne/ Other Zoonotic Diseases	Brucellosis	0	0
	Malaria	0	0
	Rabies Exposure[d]	113	9
Antibiotic resistant microorganisms	Methicillin-resistant Staph. Aureus	37	13
	Vancomycin-resistant Enterococci	0	4

NWT HIV Infections Reported from 1987 to 2007

Age at Diagnosis									Gender		Risk Category						
Total	0-9	10-14	15-19	20-29	30-39	40-49	50-59	60+	Female	Male	MSM	MSM / IDU	IDU	Hetero-sexual	Perinatal	Blood Products	Other
35	2	0	0	5	20	6	1	1	8	27	13	1	7	10	2	1	1

a Statistics are based on currently available data and previous data may be subject to change
b Men who have sex with men (MSM)
c Injection Drug User (IDU)
d Late case reporting

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Health Protection Unit